

Application No: 10/173,977

REMARKSClaim Rejection under 35 U.S.C. § 102

Claims 1, 4, 5, 20, 22, 25, 26, 43, 43, 45, 46 48 were rejected under 35 U.S.C. § 102(b), as being anticipated by Caswell (U.S. Pat. No. 4,137,873). The applicant respectfully traverses the application of Caswell to anticipate the claims of the present application. Caswell clearly has a wavy top wall having five concave surfaces interconnected by four convex surfaces. See Caswell Figs. 1-4. The claims of the present application are limited to a single concave surface and three convex surfaces.

Further, the piston of Caswell has no crown. As noted at col. 2, lines 1-20 of Caswell, the head portion of the piston includes a flexible top wall that extends to the cylindrical side walls of the piston. The flexible top wall in its entirety forms the combustion chamber. This is evident in both the depictions of the first embodiment of Figs. 1 and 2 and of the second embodiment of Figs. 3 and 4 of Caswell. The claims of the present application specifically recite a crown.

Assuming that the top wall of the Caswell piston could be considered a crown of the piston, (See above for a contrary view.), the top wall is not orthogonally disposed relative to the piston side wall. As is known, the term orthogonal relates to or pertains to right angles. Since the entirety of the Caswell top wall is wavy, there is no portion of the top wall that is at a right angle to the side wall. The claims of the present application specifically recite a crown that is orthogonal relative to a side wall.

Further, Caswell recites throughout that the combustion chamber is flexible in order to vary the compression ratio. The independent claims of the present application have been amended to now recite that the combustion chamber is inflexible, a further distinction with respect to Caswell.

In view of the foregoing, reciting multiple differences between the cited art and the claims of the present application, it is respectfully requested that the rejection be withdrawn.

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Claim Rejection under 35 U.S.C. § 103

Claims 1-52, were rejected under 35 U.S.C. § 103(a) as being unpatentable over Komiyama, et al. (U.S. Pat. No. 4,164,913) in view of Dunn, et al. (U.S. Pat. No. 4,140,196) as follows:

Regarding claims 1, 2, 22, 23, 43, 44: Komiyama discloses a combustion/piston or a method of an diesel engine, comprising: a combustion chamber being defined intersecting a crown of the piston, the combustion chamber being defined by a concave surface and two convex surfaces, adjacent surfaces having direct smooth junctures (see figure 8). Komiyama further discloses post/first/second annular surfaces or a combustion chamber center portion being defined at least in part by the convex sphere to define a post, the sphere having a radius and an origin, the origin of the radius lying on a combustion chamber central axis (see figure 8): a combustion chamber second curved surface forming substantially a bowl bottom margin and being a concave annular surface and having an origin and a radius and being joined to the post, the second curved surface providing a minor part of the combustion chamber reentrancy (see figure 8, numeral 12): a combustion chamber third curved surface being a convex annular surface and forming a portion of a combustion chamber side margin and providing a major part of the combustion chamber reentrancy, the third curved surface having an origin and a radius and being joined to the second curved surface (see figure 8, numeral 13).

Komiyama fails to disclose a combustion chamber fourth curved surface defining the third convex annular bowl lip surface intersecting the crown of the piston.

However, Dunn teaches the third convex surface (see numeral 4) Dunn further teaches the convex annular bowl lip provides a reentrant profile (see column 4, lines 23 to 25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify device of Komiyama by providing a third convex annular bowl lip surface as taught by Dunn in order to provide a reentrant profile as taught by Dunn.

Concerning the 35 U.S.C. § 103 (a) rejections, as the Examiner knows, the PTO recognizes in MPEP §2142:

The legal concept of *prima facie* obviousness is a procedural tool of examination which applies broadly to all arts. It allocates who has the burden of going forward with production of evidence in each step of the examination process. The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. *If the examiner does not produce a prima facie case, the applicant is under no obligation to submit evidence of nonobviousness...* The initial evaluation of *prima facie*

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obviousness thus relieves both the examiner and applicant from evaluating evidence beyond the prior art and the evidence in the specification as filed until the art has been shown to suggest the claimed invention.

Applicant's claims are directed to a combustion chamber that is formed free of flat surfaces. Combustion chambers formed in the crown of a piston are well known in the art. Typically, such combustion chambers employ at least one flat surface. See specifically, the Komiyama and Dunn references noted above in conjunction with the 103 rejections.

A problem that has plagued prior art combustion chambers is unsatisfactory levels of NO<sub>x</sub> and soot emissions. Attempts to reduce such emissions typically have resulted in inducing attendant deleterious effects on the performance of the engine employing such modified combustion chambers.

The Applicant has determined, contrary to conventional thought, that the combustion chamber being defined by a concave surface and three convex surfaces, adjacent surfaces having direct smooth junctures and being formed free of flat surfaces is effective at reducing the unsatisfactory levels of NO<sub>x</sub> and soot emissions of prior art combustion chambers without inducing attendant deleterious effects on the performance of the engine employing such modified combustion chambers. These unexpected results are noted in the graphs of Figs. 2 and 3 of the present application.

The determination of obviousness rests on whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made. *Kahn v. General Motors Corp.*, 135 F.3d 1472, 45 U.S.P.Q.2d 1608 (Fed. Cir. 1998). In determining obviousness, four factors should be weighed: (1) the scope and content of the prior art, (2) the differences between the art and the claims at issue, (3) the level of ordinary skill in the art, and (4) whatever objective evidence may be present. *Graham v. John Deere Co.*, 383 U.S. 1 (1966); *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1 U.S.P.Q.2d 1593 (Fed. Cir. 1987), *cert. denied*, 481 U.S. 1052 (1987). Among the factors supporting a finding of non-obviousness are the satisfaction of a long-felt need, failure of others to find a solution to the problem at hand, and copying of the invention by others. *Pro-Mold and Tool Co., Inc. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 37 U.S.P.Q.2d 1626 (Fed. Cir. 1996)

The Examiner carries the burden under Section 103 to establish a *prima facie* case of obviousness, *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988), and must show that the reference(s) relied on teach or suggest all of the limitations of the claims. *In re Wilson*, 424 F.2d 1382, 1385 (C.C.P.A. 1970). Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor. *Para-Ordnance Manufacturing, Inc. v. SGS*

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*Importers International, Inc.*, 73 F.3d 1085, 37 U.S.P.Q.2d 1237 (Fed. Cir. 1995), *cert. denied*, 117 S.Ct. 80 (1996).

When determining the differences between the prior art and the claims at issue, it is essential to view the claims at issue as "the invention as a whole." 35 U.S.C. § 101. It is legally improper to focus on the obviousness of substitutions and differences between the claimed invention and the prior art rather than on the obviousness of the claimed invention *as a whole* relative to that prior art. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1383, 231 U.S.P.Q. 81, 93 (Fed. Cir. 1986), *cert. denied*, 480 U.S. 947 (1987).

While obviousness may be found by combining references, absent a suggestion to combine the references such combination is inappropriate. *Texas Instruments Inc. v. U.S. Int'l Trade Comm'n*, 988 F.2d 1165, 26 U.S.P.Q.2d 1018 (Fed. Cir. 1993). It is insufficient that the prior art discloses the components of the claims sought to be patented. A teaching, suggestion or incentive to make the combination is required for the combination of the art to demonstrate obviousness. *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 15 U.S.P.Q.2d 1321 (Fed. Cir. 1990).

Claims 1-52 are not made obvious by Komiyama in view of Dunn as the prior art does not teach the problem resolved, the Examiner has provided no motivation for modifying the Komiyama reference in the manner suggested, and all of the limitations of the claims must be taken into account in determining obviousness.

In order to streamline prosecution in this case, Applicant sets forth his remarks with respect to such rejection in light of the presently pending claims.

Applicant notes that the claims recite structure or method steps that include that the combustion chamber is defined by a concave surface and three convex surfaces, adjacent surfaces having direct smooth junctures and that the combustion chamber is formed free of flat surfaces.

The Examiner has clearly failed to uncover any combustion chamber having such characteristics. The Applicant fundamentally disagrees with the Examiner that the Dunn reference, which relates to a piston having an annular lip insert in the combustion chamber would possibly disclose, suggest or teach, much less motivate in any manner one of ordinary skill in the art to alter the Komiyama reference to form the combustion chamber being defined by a concave surface and three convex surfaces, adjacent surfaces having direct smooth junctures and being formed free of flat surfaces. Dunn has no description of the combustion chamber other than the lip. The combustion chamber of Dunn clearly has a flat bottom portion. The portion of the Dunn combustion chamber between the reference numerals 6 and 4 of Fig. 1 also appears to be flat. Accordingly, Dunn has at least one and most likely two flat surfaces in the depicted combustion chamber.

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Further, the reference sought to be modified by Dunn (Komiyama) is also a combustion chamber having flat surfaces. Komiyama exceeds the number of flat surfaces found in Dunn by employing four flat surfaces. The surface of the combustion chamber noted in Komiyama by the reference numeral 11 is noted as being "the upper quadrilateral cavity". Such a cavity definitionally has four flat surfaces. Such surfaces are readily apparent in Figs. 3, 5, 9, and 10. There is no teaching in Komiyama that the "the upper quadrilateral cavity" may be anything other than four flat sided.

As should be readily apparent and would be clearly understood by one skilled in the art, Applicant respectfully notes that it would not be obvious to combine a four flat sided combustion chamber with a combustion has two flat side to get a combustion chamber having no flat sides.

Respectfully, Applicant submits that a basic problem with the Examiner's entire reasoning rests in his failure to consider the present invention "as a whole," a fatal error in ascertaining whether a claim is obvious or is not obvious. *Jones v. Hardy*, 727 F.2d 1514, 220 U.S.P.Q. 1021 (Fed. Cir. 1984); *Kahn v. General Motors Corp.*, 135 F.3d 1472, 45 U.S.P.Q.2d 1608 (Fed. Cir. 1998) ("In determining obviousness, the invention must be considered as a whole and the claims must be considered in their entirety.").

Applicant respectfully asserts that the Examiner has ignored the "invention as a whole," and impermissibly defines the problem in terms of its solution. Applicant respectfully submits that the Examiner has pointed to no motivation in the first place for altering the combustion chamber of the Komiyama reference with the combustion chamber of the Dunn reference, other than the unsupported statement it would have been obvious to do so. There is clearly no disclosure, suggestion or teaching, much less any motivation, provided by the Examiner as being present in the Dunn reference that would lead one skilled in the art to deviate from the conventional flat surfaces of the Komiyama and Dunn references.

In that regard, Applicant respectfully assert that the Examiner is using impermissible hindsight in "[d]efining the problem in terms of its solution ... in the selection of the prior art relevant to obviousness." *Monarch Knitting Machinery Corp. v. Fukuhara Industrial & Trading Co., Ltd.*, 139 F.3d 977, 45 U.S.P.Q.2d 1977 (Fed. Cir. 1998). None of the references applied disclose, suggest or teach that a problem exists in the conventional combustion chambers that might be solved by eliminating flat surfaces in the combustion chamber. A determination of obviousness is contraindicated when the applied prior art does not teach the problem or its source. See, e.g., *Eibel Process Co. v. Minnesota and Ontario Paper Co.*, 261 U.S. 45 (1923), *In re Peehs*, 612 F.2d 1287, 204 U.S.P.Q. 835 (C.C.P.A. 1980).

"Before the PTO may combine the disclosure of two or more prior art references in order to establish *prime facie* obviousness, there must be some suggestion for doing so." *In re*

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*Jones*, 958 F.2d 347, 21 U.S.P.Q. 2d 1941 (Fed. Cir. 1992) There must be some explicit teaching or suggestion in the art to motivate one of ordinary skill to combine the references in the manner suggested. See, *Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 43 U.S.P.Q.2d 1294 (Fed. Cir. 1997); *Fromson v. Anitec Printing Plates, Inc.*, 132 F.3d 1437, 45 U.S.P.Q.2d 1269 (Fed. Cir. 1997) "To prevent the use of hindsight based on the invention to defeat patentability of the invention" the Federal Circuit "requires the examiner to show a motivation to combine the references that create the case of obviousness." *In re Roufflet*, 149 F.3d 1350, 47 U.S.P.Q.2d 1453 (Fed. Cir. 1998). Such motivation cannot be found simply by stating that one might choose curved combustion chamber surfaces simply because the selection might be found to be beneficial. If such was the case, every combustion chamber defined in terms of its characteristics would be unpatentable. This is clearly not the case.

Applicant notes that "obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination." *Carlella v. Starlight Archery*, 804 F.2d 135, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Respectfully, neither the Komiyama nor the Dunn references provide the requisite motivation for modifying the combustion chambers disclosed therein to eventuate in the embodiments set forth in the pending claims. As discussed above both the Komiyama and Dunn references employ multiple flat combustion chamber surfaces. Thus, at best, the Komiyama and Dunn references teach away from the present claims.

Applicant respectfully asserts that there is no motivation for combining the two references in the manner suggested by the Examiner except for hindsight itself. Clearly under the law, motivation for combining references can not come from the invention itself. *Heidelberger Druckmaschinen AG v. Hantscho Commercial Products, Inc.* 21 F.3d 1458, 30 U.S.P.Q.2d 1377 (Fed. Cir. 1993).

As is known, the PTO may reject a claim as obvious (albeit novel) over a single prior art reference on the ground that it would have allegedly been obvious to a person of ordinary skill in the art to change what the reference shows to that which is claimed. The change, it may be asserted, is a matter of standard design technique. More often, as is the present case, the PTO will assert obviousness on the basis of the combination of two or more prior art references, e.g., asserting that the primary reference teaches or shows most of that which is claimed and the secondary reference shows or suggests the element(s) or other teaching missing from the primary reference.

In either the single reference or plural references situation, "the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made." MPEP §2142. The examiner

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must put aside knowledge of the applicant's disclosure, refrain from using hindsight, and consider the subject matter claimed "as a whole." *Id.*

As the Examiner knows, MPEP §2143.01 provides:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*; 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

Further, the Federal Circuit has several times expressly addressed the issue of how to evaluate an alleged case of *prima facie* obviousness to determine whether it has been properly made. Thus, *In re Geiger, supra*, stated, in holding that the PTO "failed to establish a *prima facie* case of obviousness":

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984).

Of course, application of § 103 presumes the existence of differences between the subject matter claimed and the teachings of any particular prior art reference. Otherwise a rejection under § 102 would have sufficed. Thus, the Examiner must propose some modification of a particular reference or a combination thereof with another reference in order to arrive at the claimed invention. The Federal Circuit's assessment in *Geiger*, quoted above, is directed to the sufficiency of the teachings of a particular reference to justify a conclusion that any proposed modification or combination of references is what one of ordinary skill in the art would have found obvious to do at the time the invention was made. 815 F.2d at 688, 2 U.S.P.Q.2d at 1278 (Fed. Cir. 1987).

The C.C.P.A. earlier expressly held that there must be some logical reason apparent from the evidence of record that would justify a combination or modification of references. *In re Regel*, 188 U.S.P.Q. 132 (C.C.P.A. 1975). In determining whether one of ordinary skill in the art would find it obvious to modify or combine references, the teachings of the references taken with the knowledge that a worker in the art already possesses constitute the scope and content of the prior art that is referred to in the *Graham* decision. *Graham v. John Deere*, 383 U.S. 1, 148 U.S.P.Q. 459 (1966). Thus, the question raised under §103 is whether the prior art taken as a whole would suggest the claimed invention taken as a whole to one of ordinary skill in the art. Accordingly, even if all elements of a claim are disclosed in various prior art references, the claimed invention taken as a whole cannot be said to be obvious without

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some reason given in the prior art why one of ordinary skill would have been prompted to combine the teachings of the references to arrive at the claimed invention. In re Regel, supra.

*Prima facie* obviousness does exist when the prior art suggests or anticipates the benefits of modifying or combining references or when external factors, such as the changing state of the art, provide the motivation to one of ordinary skill in the art to make the modification or combination. However, where no reasonable intrinsic or extrinsic justification exists for the proposed combination or modification, *prima facie* obviousness will not have been established.

Thus, it is important to examine whether there is an intrinsic basis in the prior art or some extrinsic factor that would prompt one of ordinary skill in the art to combine the teachings of the references. If there is not, then the Examiner has not met the burden of establishing a *prima facie* case of obviousness, and the rejection must be traversed by way of denying the existence of a *prima facie* case of obviousness.

The Federal Circuit has also repeatedly warned against using the applicant's disclosure as a blueprint to reconstruct the claimed invention out of isolated teachings in the prior art. See, e.g., Grain Processing Corp. v. American Maize-Products, 840 F.2d 902, 907, 5 U.S.P.Q.2d 1788, 1792 (Fed. Cir. 1988).

More recently, the Federal Circuit reversed the Office's §103 rejection of claims in *In re Rouffet*, 149 F.3d 1350, 47 U.S.P.Q.2d 1453 (Fed. Cir. 1998), because the board had "reversibly erred in determining that one of [ordinary] skill in the art would have been motivated to combine these references in a manner that rendered the claim invention [to have been] obvious." *Id.* at 1357. The court noted that to "prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the examiner to show a motivation to combine the references that create the case of obviousness." The court set forth three possible sources for such motivation, namely "the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." *Id.* According to the court, "the Board merely invoked the high level of skill in the field of art," *Id.*, without explaining what specific understanding or technological principle within the knowledge of one of ordinary skill in the art would have suggested the combination. "If such a rote invocation could suffice to supply a motivation to combine, the more sophisticated scientific fields would rarely, if ever, experience a patentable technical advance." *Id.*

Applicant respectfully submits that the Examiner has pointed to absolutely no basis in the art for combining or modifying the references and, in fact, the Examiner is using the Applicant's disclosure as a blueprint to reconstruct the claimed invention out of isolated teachings in the



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prior art. Specifically, Applicant fails to see where the Examiner has shown any motivation to combine the references to make his case for obviousness. More specifically, Applicant submits that the Examiner has failed to set forth any of the three possible sources for such motivation, and that the Examiner has not identified the nature of the problem to be solved, the teachings of the prior art and the knowledge of persons of ordinary skill in the art that would lead a person of ordinary skill in the art to the claims as presently recited and an action acknowledging same, as respectfully requested.

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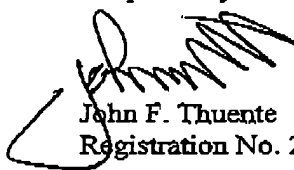
CONCLUSION

Claims 1-20, 22-41, 43-46 and 48-52 are pending. By this Amendment, claims 1, 22, and 43 are amended.

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,



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